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(71) Applicant (*for all designated States except US*): **C.H. FOOD B.V. [NL/NL]; Liessentstraat 4, NL-5405 AG Uden (NL).**

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **VAN CUIJK, Wilhelmus, Henricus, Maria [NL/NL]; Nieuburgstraat 2, NL-5401 AD Uden (NL).**

(74) Agents: **VAN DEN HEUVEL, Henricus, Theodorus et al.; Patentwerk B.V., P.O. Box 1514, NL-5200 BN 's-Hertogenbosch (NL).**

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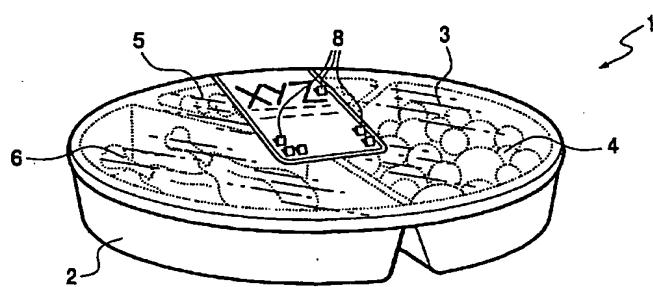
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(54) Title: **FOOD PACKAGE AND METHOD FOR HEATING A FOOD PACKAGE**



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(57) Abstract: The invention relates to a package (1) for containing a plurality of products for heating, comprising: a container (2), manufactured from a material for once-only use, provided with at least two compartments (4, 5, 6) shielded from the environment, and at least one passage opening (8) arranged in the package for a medium for reducing an overpressure in the package, wherein the pressure in the compartments can be maintained at different levels. The invention further relates to a method for heating a plurality of products for heating placed in a single container to different temperatures using a heating source.

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FOOD PACKAGE AND METHOD FOR HEATING A FOOD PACKAGE

The invention relates to a package for containing a plurality of products for heating, in particular food products, comprising: a container, manufactured from a material for once-only use, provided with at least two compartments shielded from the environment, and at least one passage opening arranged in the package for a medium for reducing an overpressure in the package. The invention also relates to a method for heating a plurality of products for heating placed in a single package to different temperatures using a heating source.

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There has been a considerable increase in the use of meals which are simple to prepare. An example hereof is formed by the prepared meals which only need to be heated to be suitable for consumption. Such means are usually precooked and then cooled until shortly before the moment of use. Such meals are applied inter alia for home use and for use in institutions, hospitals and schools. Heating of the cooled meal can take place in diverse ways, although the most usual is placing of the package in hot water or placing of the package in an oven. A drawback of these meals and the method of heating thereof is that all components making up the meal undergo the same heating. This detracts from the possibilities of preparing appetizing and healthy meals in this manner. Determined ingredients must for instance not become too hot in order to remain optimally vitamin-rich (for instance vegetables), other ingredients must not exceed a different specific temperature because this damages the texture or structure (for instance sauces), while conversely a third ingredient must exceed a specific temperature so as to be fully cooked or to kill bacteria (for instance meat or poultry). In addition, there may also be culinary reasons for desired temperature differences between different meal components.

The object of the present invention is to provide a package and method with which a plurality of products brought together in a single container can be heated in simple manner with a single heating source, wherein the diverse products are heated to different temperatures.

The invention provides for this purpose a package of the type stated in the preamble, characterized in that the compartments are separated medium-tightly from each other,

and the individual compartments are provided with passage openings differing from each other such that overpressure in the individual compartments is maximized at different pressure levels. The temperature will stabilize at a determined value depending on the pressure applied to a product during the heating. Compare for instance the 5 pressure cooker in which a relatively high pressure is realized, resulting in a higher cooking temperature, and a mountain climber who at high altitude already boils water at 80°C. By now connecting different passage openings (different pressure valves) to the different compartments, it will also be possible to realize different pressures (and therefore also temperatures) in the different compartments. This while the package still 10 only need be heated with a single heating source, so that no complex operations are required for the heating. In addition to food at varying temperatures, non-food products can also be heated in this manner, optionally in combination with food products (for instance a so-called hot towel). In a preferred embodiment the compartments are shielded from the environment by making use of a material layer, such as for instance a 15 transparent plastic foil, so that a view of the products in the container can be provided with minimal use of material.

In order to prevent undesirable exchange of gas between the environment and the interiors of the compartments, the passage openings are preferably blocked prior to use 20 of the package, and open under the influence of pressure in the compartments. This guarantees a medium-tight closure of the compartments prior to use (heating) of the package. The result hereof is that perishable goods can be preserved for longer. Only when the operation of the passage openings becomes relevant are they opened (when a determined pressure is reached). Another option for ensuring closure of the passage 25 openings before the start of heating can be realized in accordance with an embodiment variant in that the passage openings are blocked prior to use of the package, and open under the influence of a determined temperature being exceeded. This measure can also be applied in combination with opening of the passage openings under the influence of pressure, and this then results in increased certainty that the openings do not open 30 prematurely (for instance in the case of uncontrolled pressure being applied to the package before heating begins).

The separate passage openings can be provided with underpressure valves acting at different pressure levels, and already known types of underpressure valve can for

instance be applied for this purpose. It is also possible for the individual compartments to have passage openings with a total passage surface varying per compartment; these can bring about a determined pressure level in a compartment only when the passage surface is sufficiently small. One or more passage openings can connect as desired to a 5 single compartment. It is thus possible for instance to make use in a package of only a single dimension for all passage openings, wherein the number of passage openings is varied per compartment.

In an embodiment variant of the package according to the present invention which is 10 simple and inexpensive to manufacture, the passage openings are blocked prior to use of the package by means of a cover element (sticker) fixed with an adhesive layer, wherein the adhesive layer softens at a determined temperature. For a further increase in efficiency, such a cover element can also be used as information carrier relating to the content of the package, so that it serves a dual purpose. The cover element can 15 moreover cover a plurality of passage openings as a single cover element, wherein weakened portions are then arranged in the cover element at the position of the passage openings, so that the cover element is released at the same moment at all positions where it covers a passage opening. It is noted that it is also possible to vary this measure; a conscious choice can be made to arrange a greater or lesser degree of 20 weakening so as to further vary the moment at which the different passage openings open. As material for the cover element it is possible to choose from any conceivable material, such as for instance plastic or paper. In a particular variant use is made of a double foil layer, only one of the layers being provided with passage openings. Alternatively, the cover element can also be combined with the adhesive layer; an 25 example hereof is an ink layer with which passage openings are closed.

It can be advantageous in practice for the passage openings to be arranged in the material layer (foil layer) with which the compartments are shielded from the environment. Such a foil layer is easy to provide with small openings and is generally 30 situated on the top side of the package so that the product does not have to come into contact therewith (at least when the compartments are not fully filled), which, among other things, reduces the risk of leakage. Alternatively however, it is also possible for the passage openings to be arranged in the container.

In addition to the above described package, the invention also comprises an assembly of such a package and a plurality of products, in particular food products, placed in the individual compartments. By means of this assembly the advantages can be realized as described above with reference to the package according to the invention.

5

The invention also provides a method for heating to different temperatures with a heating source a plurality of products for heating, in particular food products, placed in a single container, by heating with a heating source the container with a plurality of separated compartments provided with the products for heating, wherein an

.10 overpressure is created in the compartments which is bounded by passage openings connecting onto the individual compartments such that different pressures prevail and different temperatures occur in the compartments. The package can herein be heated with only a single heating source, such as for instance a microwave oven, a hot air oven, a warm water bath or other known heat source for heating food products in particular.

15 The package can for instance be readily placed in an oven which feeds heat to the container, whereafter, provided the package is heated for long enough at a prescribed temperature, the different products in the different compartments are heated to the intended distinct temperature levels without further intervention. After heating, the compartments can be made accessible for a meal by for instance detaching a material

20 layer. It is particularly advantageous here if the material layer can be detached easily (also referred to as a peel-off attachment of the material layer). This reduces the danger, among others, of hot products leaving the container in uncontrolled manner.

25 The invention will be further elucidated with reference to the non-limitative exemplary embodiments shown in the following figures, in which:

figure 1A shows a perspective view of a package according to the invention filled with food products before the start of heating,

figure 1B shows a perspective view of the package shown in figure 1A during heating,

figure 1C shows a perspective view of the package shown in figures 1A and 1B after 30 opening,

figure 2 is a perspective view of an alternative embodiment variant of the package according to the invention,

figure 3A shows a schematic cross-section through a closed passage opening,

figure 3B shows a schematic cross-section through the passage opening shown in figure 3A, now however in an opened position, and

figure 4 shows a schematic cross-section through yet another embodiment variant of the package according to the invention.

5

Figure 1A shows a package 1 provided with a container 2 which is covered with a transparent foil 3 such that package 1 comprises three compartments 4, 5, 6 separated medium-tightly from each other and the environment. A sticker 7 containing product information is placed on foil 3. Package 1 is adapted particularly to contain food, and is
10 generally kept refrigerated prior to use.

During heating of package 1, which is shown in figure 1B, the adhesive layer with which sticker 7 is adhered to foil 3 will soften (see also description relating to figure 3B). As a consequence partially released portions 8 of sticker 7 will be pressed upward
15 by medium pressure exerted from compartments 4, 5, 6 on the partially released portions 8 by means of openings (not shown) arranged specially for this purpose in foil 3. The openings in foil 3 are relatively small, and the number of openings in foil 3 can be varied at the position of the different compartments 4, 5, 6. It can be seen in the figure that two pressed-upward, released portions 8 connect onto compartment 4, one
20 pressed-upward, released portion 8 connects onto compartment 5 and three pressed-upward, released portions 8 connect onto compartment 6. The pressure in compartments 4, 5, 6 will thus be able to vary. Once package 1 has been heated for a sufficiently long time, foil 3 can be pulled loose and food 9, 10, 11 in container 2 is accessible for consumption, see herefor figure 1C.

25

Figure 2 shows a package 9 with a container 2, wherein more conventional valves 11, 12, 13 are placed in foil 3 which function at mutually differing pressures. The pressure in the individual compartments 4, 5, 6 can thus also be maximized at mutually differing values.

30

Figure 3A shows a schematic section through a foil 14 in which an opening 15 is arranged. A sticker 16 is adhered to foil 14 using an adhesive layer 17 such that sticker 16 closes the opening 15 in foil 14. A cut 18 is further made in foil 14. The situation shown in this figure corresponds to a situation of a passage opening in package 1 of

figure 1A prior to heating of package 1. When package 1 is now heated the situation as shown in figure 3B will result. By means of pressure exerted on sticker 16 through opening 15 in foil 14, in combination with softening of adhesive layer 17 at a determined temperature and the cut 18, a sticker portion 19 will be pressed away from 5 foil 14. The consequence hereof is that the opening 15 in the foil is left clear and will function as passage opening for medium (gases, steam and so on).

Finally, figure 4 shows yet another package 20, now however with two stacked compartments 21, 22. The lower compartment contains for instance soup 23, while the 10 upper compartment 22 contains for instance soup balls 24 and soup vegetables 25. The upper compartment closes the lower compartment 21 and compartments 21, 22 are coupled to each other by a connecting element 26 to prevent undesired release of compartments 21, 22 from each other. The upper compartment 22 is closed with a foil 27 in which three passage openings 28 are placed, while a passage opening 29 is also 15 provided in the bottom of the upper compartment 22. Package 20 is now dimensioned such that the pressure level in upper compartment 22 is maximized at a lower level than the pressure level in lower compartment 21. It will hereby be possible to heat soup 23 to a higher temperature than soup balls 25 and soup vegetables 25, which moreover also undergo a kind of steam treatment.

Claims

1. Package for containing a plurality of products for heating, in particular food products, comprising:
 - 5 - a container, manufactured from a material for once-only use, provided with at least two compartments shielded from the environment, and
 - at least one passage opening arranged in the package for a medium for reducing an overpressure in the package,
characterized in that the compartments are separated medium-tightly from each other,
- 10 and the individual compartments are provided with passage openings differing from each other such that overpressure in the individual compartments is maximized at different pressure levels.
2. Package as claimed in claim 1, characterized in that the compartments are
15 shielded from the environment by making use of a material layer.
3. Package as claimed in claim 1 or 2, characterized in that the passage openings are blocked prior to use of the package, and open under the influence of pressure in the compartments.
20
4. Package as claimed in any of the foregoing claims, characterized in that the passage openings are blocked prior to use of the package, and open under the influence of a determined temperature being exceeded.
- 25 5. Package as claimed in any of the foregoing claims, characterized in that the separate passage openings are provided with underpressure valves acting at different pressure levels.
6. Package as claimed in any of the foregoing claims, characterized in that the
30 individual compartments have passage openings with a total passage surface varying per compartment.
7. Package as claimed in any of the foregoing claims, characterized in that the passage openings are blocked prior to use of the package by means of a cover element

fixed with an adhesive layer, wherein the adhesive layer softens at a determined temperature.

8. Package as claimed in claim 7, characterized in that a single cover element
5 covers a plurality of passage openings and that weakened portions are arranged in the cover element at the position of the passage openings.

9. Package as claimed in any of the claims 2-8, characterized in that passage
openings are arranged in the material layer with which the compartments are shielded
10 from the environment.

10. Package as claimed in any of the foregoing claims, characterized in that passage
openings are arranged in the container.

15 11. Assembly of a package as claimed in any of the foregoing claims and a plurality
of products, in particular food products, placed in the individual compartments.

12. Method for heating to different temperatures with a heating source a plurality of
products for heating, in particular food products, placed in a single container, by heating
20 with a heating source the container with a plurality of separated compartments provided
with the products for heating, wherein an overpressure is created in the compartments
which is bounded by passage openings connecting onto the individual compartments
such that different pressures prevail and different temperatures occur in the
compartments.

25

13. Method as claimed in claim 12, characterized in that the container is heated with
a single heating source.

14. Method as claimed in claim 12 or 13, characterized in that the container is
30 placed in an oven.

15. Method as claimed in any of the claims 12-14, characterized in that after heating
the compartments are made accessible for a meal by detaching a material layer.

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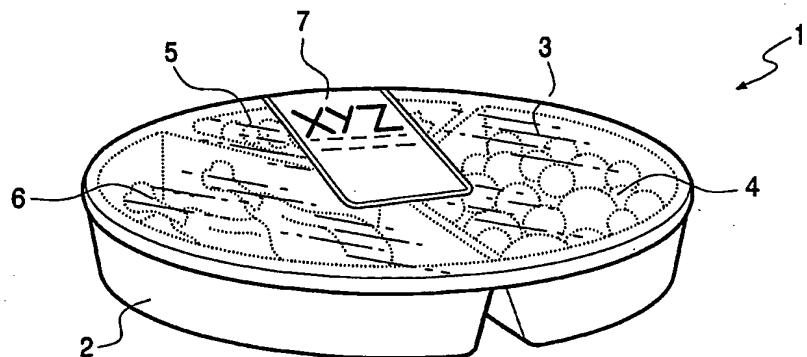


FIG. 1A

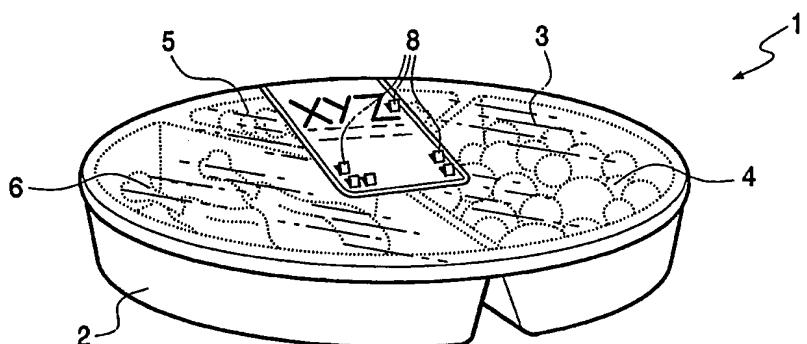


FIG. 1B

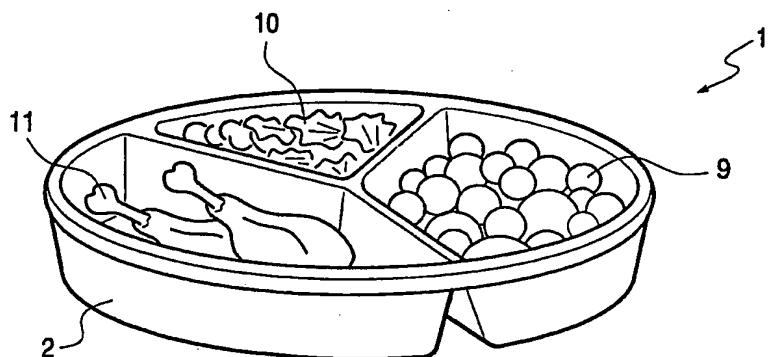


FIG. 1C

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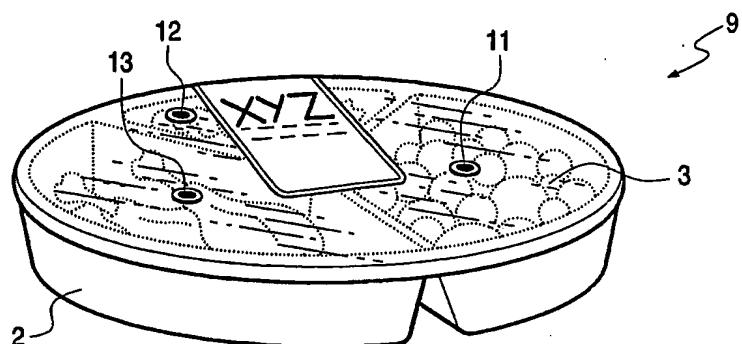


FIG. 2

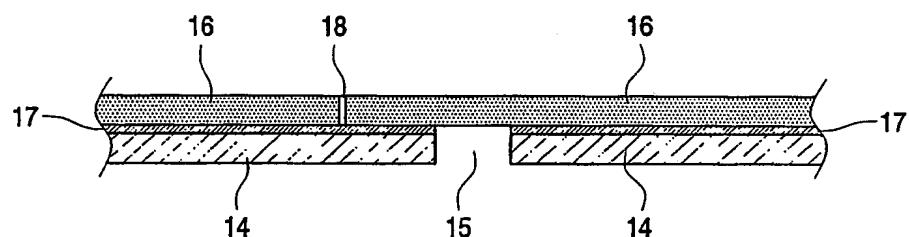


FIG. 3A

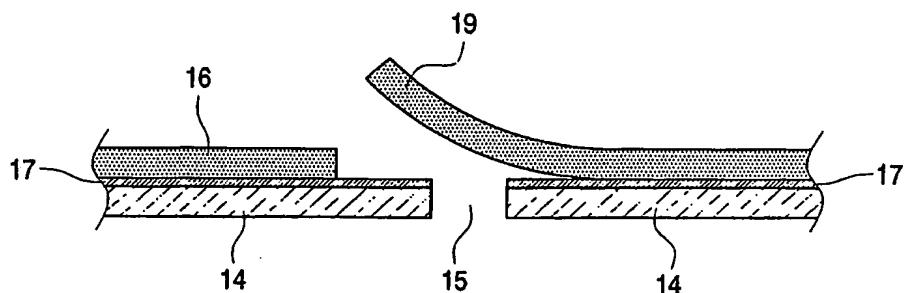


FIG. 3B

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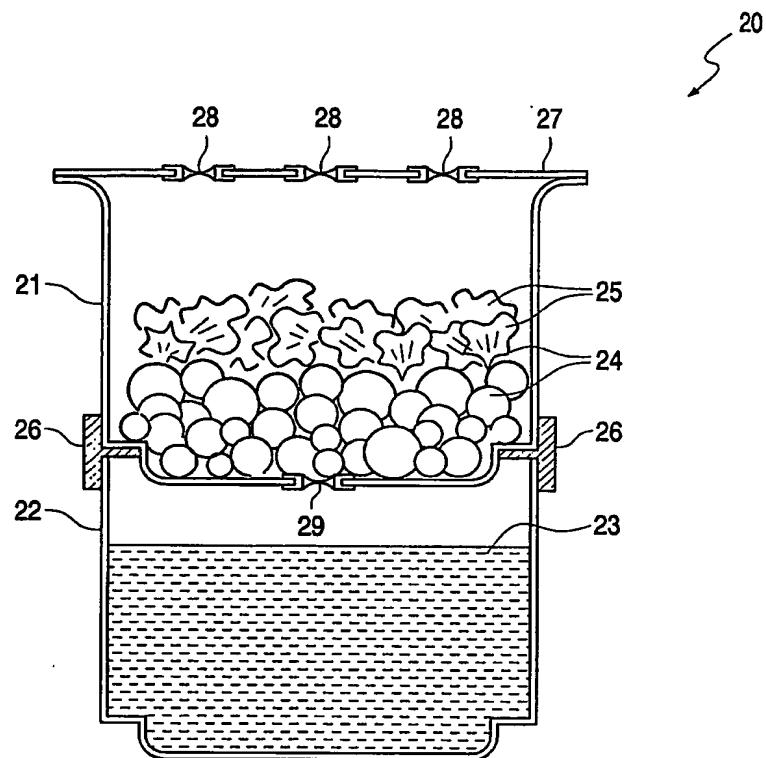


FIG. 4

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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL 03/00790

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D1/36 B65D77/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 4 013 798 A (GOLTSOS COSTAS E) 22 March 1977 (1977-03-22) abstract; figures | 1-3,8, 11-15 |
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| A | FR 2 625 973 A (BARILLOT JOEL) 21 July 1989 (1989-07-21) -/- | |

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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| Date of the actual completion of the International search | Date of mailing of the International search report |
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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

SERRANO GALARRAGA, J

INTERNATIONAL SEARCH REPORTInternational Application No
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| C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|---|---|-----------------------|
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